

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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In re application of : Attorney Docket
No.: PD111
Applicant: Pascal DELRIEU and Li DING :
Application No.: Unknown (Continuation of : GAU: Unknown
USAN 09/ 431,742) :
Filed: November 1, 1999 : Examiner: Unknown
:
For: "AGAR GEL BEAD COMPOSITION
AND METHOD"
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November 12, 2001

Assistant Commissioner for Patents
Washington, D.C. 20231

P R E L I M I N A R Y A M E N D M E N T

S I R:

Prior to calculation of the filing fee, please make the following
amendments, referring to claims 1-18 as originally filed in the parent application.

IN THE CLAIMS:

Please CANCEL claims 1-18 *without prejudice*.

Please ADD new claims 19-62 reading as follows:

Claim 19. (new) A method of preparing gel particles comprising:

- a) forming a hot aqueous solution of a gelling agent, the solution being gellable at a

temperature below the solution temperature;

- b) discharging the hot gelling agent solution through a discharge orifice into a cold moving stream of hydrophobic liquid the cold hydrophobic liquid being immiscible with the gelling agent solution and being at a temperature below the gelling agent gelling point;

wherein the gel particles coalesce from the gelling agent solution in the cold hydrophobic liquid stream.

Claim 20. (new) A method according to claim 19 wherein the cold hydrophobic liquid stream is contained in a conduit, the discharge orifice is located in the conduit and wherein the cold hydrophobic liquid stream moves past the discharge orifice and exerts a force on hot solution in the discharge orifice, the force acting to withdraw the hot solution from the discharge orifice.

Claim 21. (new) A method according to claim 19 comprising discharging the hot gelling agent through an injection tube, the injection tube terminating in the discharge orifice wherein the discharge orifice is positioned in the moving stream of cold hydrophobic liquid.

Claim 22. (new) A method according to claim 21 comprising containing the cold hydrophobic liquid in a conduit wherein the injection tube extends into the conduit.

Claim 23. (new) A method according to claim 22 wherein the conduit has a rectilinear

portion and the injection tube extends approximately perpendicularly into the rectilinear portion of the conduit.

Claim 24. (new) A method according to claim 22 wherein the conduit has a cross-sectional area of from about 4 to about 100 times the cross-sectional area of the injection tube, optionally at least 25 times.

Claim 25. (new) A method according to claim 22 wherein the ratio of the flow rate of the hot gelling agent solution to the flow rate of the cold hydrophobic liquid is between about 1:2 and 1: 50.

Claim 26. (new) A method according to claim 22 wherein the injection tube has an internal diameter of from about 0.05 to about 10 mm.

Claim 27. (new) A method according to claim 22 wherein the conduit has a cross-sectional area of from about 4 to about 400 times the cross-sectional area of the injection tube, the ratio of the flow rate of the hot gelling agent solution to the flow rate of the cold hydrophobic liquid is between about 1:2 and 1: 50 and the injection tube has an internal diameter of from about 0.05 to about 10 mm.

Claim 28. (new) A method according to claim 22 comprising cooling the hydrophobic liquid upstream of the discharge orifice.

Claim 29. (new) A method according to claim 28 comprising separating the gel particles from the hydrophobic liquid and recirculating the hydrophobic liquid to the discharge orifice.

Claim 30. (new) A method according to claim 19 wherein the cold hydrophobic liquid stream is contained in a conduit, the hot gelling agent is discharged through an injection tube and the injection tube terminates in the discharge orifice, the discharge orifice being located in the conduit and wherein the cold hydrophobic liquid stream moves past the discharge orifice and exerts a force on hot solution in the discharge orifice, the force acting to withdraw the hot solution from the discharge orifice.

Claim 31. (new) A method according to claim 30 wherein the gel particles are capable of being manually crushed and applied topically by an end user.

Claim 32. (new) A method according to claim 30 wherein the gelling agent comprises a pH stable water-soluble polymer optionally selected from the group consisting of synthetic polymers, vinyl polymers and copolymers, acrylamide polymers and copolymers, natural polymers, polysaccharides, proteins, synthetically modified polysaccharides, synthetically modified proteins, botanically derived gels and carbopol.

Claim 33. (new) A method according to claim 32 wherein the gelling agent solution further comprises a dissolved restraining polymer.

Claim 34. (new) A method according to claim 33 wherein the gelling agent solution further comprises a labile active agent.

Claim 35. (new) A method according to claim 34 wherein the labile active agent is retained in the gel beads by the restraining polymer.

Claim 36. (new) A method according to claim 22 wherein the hot gelling agent solution further comprises an active agent and, optionally, a restraining polymer to retain the active agent in the gel beads.

Claim 37. (new) A method according to claim 19 comprising pumping the hot gelling agent solution from a heated vessel containing a bulk supply of the hot gelling agent solution to the discharge orifice.

Claim 38. (new) A method according to claim 37 comprising recirculating the cold hydrophobic liquid through a cooled tank.

Claim 39. (new) A method according to claim 38 comprising recirculating a coolant between a chiller and the cooled tank to maintain a desired low temperature in the tank.

Claim 40. (new) A method according to claim 37 comprising flowing the hydrophobic liquid containing gel particles over a screen to separate the gel particles from the hydrophobic liquid.

Claim 41. (new) A method according to claim 19 comprising pumping the hot gelling agent solution from a heated vessel containing a bulk supply of the hot gelling agent solution to the discharge orifice, recirculating the cold hydrophobic liquid through a cooled tank, recirculating a coolant between a chiller and the cooled tank to maintain a desired low temperature in the tank and flowing the hydrophobic liquid containing gel particles over a screen to separate the gel particles from the hydrophobic liquid.

Claim 42. (new) A method according to claim 19 comprising selecting the discharge size of the discharge orifice and the velocity of the moving stream of cold hydrophobic liquid according to the desired gel particle size.

Claim 43. (new) A method according to claim 19 wherein the flow rate of the cold hydrophobic liquid is greater than the flow rate of the gelling agent solution.

Claim 44. (new) A method according to claim 19 comprising discharging the gelling agent solution into the cold hydrophobic liquid stream at a flow rate of from about 2.5 to 6.2 ml/min wherein the cold hydrophobic liquid stream moves with a flow rate of from about 10 ml/min to about 300 ml/min.

Claim 45. (new) A method according to claim 19 operated to make beads of from about 2.8 to about 4 mm diameter or from about 0.4 to about 0.7 mm diameter.

Claim 46. (new) Apparatus for performing the method of claim 19 comprising

- a) a hot liquid source being a source of a hot aqueous solution of a gelling agent, the gelling agent solution having a gelling point being a temperature at which the solution gels, the gelling point being below the solution temperature;
- b) a cold liquid source being a source of a cold hydrophobic liquid immiscible with the gelling agent solution, the cold hydrophobic liquid being maintained at a temperature below the gelling agent gelling point; and
- c) a discharge orifice for receiving the hot gelling agent solution from the cold liquid source and discharging the hot gelling agent solution into the cold hydrophobic liquid; and
- d) a cold liquid conduit carrying a moving stream of the cold hydrophobic liquid; wherein the discharge orifice is disposed to discharge the hot gelling agent solution into the moving stream of cold hydrophobic liquid to generate gel particles in the hydrophobic liquid stream.

Claim 47. (new) Apparatus according to claim 46 comprising an injection tube for injecting the hot gelling agent solution into the cold liquid stream, the injection tube being terminated by the discharge orifice, the discharge orifice being located in the cold liquid conduit so that movement of the cold hydrophobic liquid stream past the discharge orifice draws the hot gelling agent solution through the discharge orifice.

Claim 48 (new) Apparatus according to claim 47 wherein the cold liquid conduit has a rectilinear portion and the injection tube extends approximately perpendicularly into the rectilinear portion of the conduit.

Claim 49. (new) Apparatus according to claim 46 wherein the internal diameter of the cold liquid conduit is greater than the internal diameter of the injection tube, optionally from about 4 to about 400 times the cross-sectional area of the injection tube or, optionally also, at least 25 times the cross-sectional area of the injection tube.

Claim 50. (new) Apparatus according to claim 46 operable so that the ratio of the flow rate of the hot gelling agent solution to the flow rate of the cold hydrophobic liquid is between about 1:2 and 1: 50.

Claim 51. (new) Apparatus according to claim 46 wherein the injection tube has an internal diameter of from about 0.05 to about 10 mm, optionally about 0.8 mm.

Claim 52. (new) Apparatus according to claim 46 comprising an injection tube for injecting the hot gelling agent solution into the cold liquid, the injection tube being terminated by the discharge orifice, the discharge orifice being located in the cold liquid conduit for the cold hydrophobic liquid stream to move past the discharge orifice and draw the hot gelling agent solution through the discharge orifice wherein the cold liquid conduit has a rectilinear portion and the injection tube extends approximately perpendicularly into the rectilinear portion of the conduit wherein the internal diameter of the cold liquid conduit is greater than the internal diameter of the injection tube, optionally from about 4 to about 400 times the cross-sectional area of the injection tube, and wherein the ratio of the flow rate of the hot gelling agent solution to the flow rate of

the cold hydrophobic liquid is between about 1:2 and 1: 50.

Claim 53. (new) Apparatus according to claim 46 wherein the cold liquid source comprises a chiller to cool the hydrophobic liquid upstream of the discharge orifice.

Claim 54. (new) Apparatus according to claim 53 comprising a cooled reservoir of the hydrophobic liquid wherein the chiller coupled with the cooled reservoir to cool hydrophobic liquid therein.

Claim 55. (new) Apparatus according to claim 54 wherein the reservoir comprises a tank and the cold hydrophobic liquid can be recirculated through the cooled tank.

Claim 56. (new) Apparatus according to claim 46 comprising a separator to separate the gel particles from the hydrophobic liquid the separator being connected with the cold liquid source for recirculation to the discharge orifice of hydrophobic liquid received from the separator.

Claim 57. (new) Apparatus according to claim 56 wherein the separator comprises a screen.

Claim 58. (new) Apparatus according to claim 55 comprising a separator to separate the gel particles from the hydrophobic liquid the separator being connected to deliver hydrophobic liquid to the cooled tank for recirculation to the discharge orifice.

Claim 59. (new) Apparatus according to claim 46 wherein the hot liquid source comprises a heated vessel containing a bulk supply of the hot gelling agent solution.

Claim 60. (new) Apparatus according to claim 59 wherein the heated vessel is jacketed for insulation and comprises a mixer.

Claim 61. (new) Apparatus according to claim 46 wherein the apparatus comprises a pump to pump the hot gelling agent solution from the heated vessel to the discharge orifice.

Claim 62. (new) Apparatus according to claim 46 wherein the hot liquid source comprises a heated vessel containing a bulk supply of the hot gelling agent solution, the cold liquid source comprises a cooled tank of hydrophobic liquid and the apparatus comprises:

- e) a pump to pump the hot gelling agent solution from the heated vessel to the discharge orifice;
- f) recirculating apparatus to recirculate the cold hydrophobic liquid through the cooled tank;
- g) a chiller to cool the cooled tank;
- h) a screen to separate the gel particles from the hydrophobic liquid; and
- i) flow-directing apparatus direct the flow of hydrophobic liquid containing gel particles over the screen to separate the gel particles from the hydrophobic

liquid.

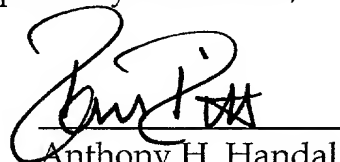
Claim 62 (new) Gel beads comprising an aqueous gel and a gel-inhibiting solvent absorbed on porous inert particles dispersed in the gel beads.

REMARKS

New claims 19-62 define the protection now sought in the present application and include subject matter restricted out of the parent application. Early and favorable examination are respectfully requested. If for any reason the Examiner feels that consultation with Applicant's representative would be helpful in the advancement of the prosecution, he or she is invited to call the telephone number below for an interview.

Respectfully submitted,

By:


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